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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/896,261	06/29/2001	Richard G. Rateick JR.	140-99-005	8033

7590 06/10/2003

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EXAMINER	
WILKINS III, HARRY D	

ART UNIT	PAPER NUMBER
1742	9

DATE MAILED: 06/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n No.	Applicant(s)	
	09/896,261	RATEICK ET AL.	
	Examin r	Art Unit	
	Harry D Wilkins, III	1742	

-- The MAILING DATE of this communication appears on th cover sh t with th corr spond nce addr ss --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19,21 and 22* is/are pending in the application.

4a) Of the above claim(s) *8,13 and 14* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-12,15-19,21 and 22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. Claims 1-19, 21 and 22 are pending.

2. The rejection under 35 USC 103 based on Beck et al, "Cold Heading" and Rateick, Jr has been withdrawn in view of the amendment of the claims and the newly cited reference Miller (US 3,890,106).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-6, 9-12 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beck et al (DE 19652326) in view of "Cold Heading", Miller (US 3,890,106) and Rateick, Jr (US 5,728,475).

Beck et al teach (see figures and Derwent abstract) a method of making a wear resistant shoe that includes the step of machining a blank (designated by outline "2") to a final product with a cam engaging portion "14". The blank of Beck does include one section that radially larger than the other portion, and it is this section that is used to form the cam engaging portion. However, Beck et al do not teach the method of making the blank.

Beck et al do not teach first cold-heading one end portion of a generally cylindrical blank or subsequently cold-working the opposite end portion (the "hollow cavity").

"Cold Heading" describes a method of deforming a generally cylindrical blank to create one end which is increased in size radially and decreased in size axially. "Cold Heading" teaches (see col 1 of page 291) that the process has advantages over machining from suitable stock that include almost no waste material and increased strength from cold working.

Miller teaches (see abstract) the desirability of cold forming only a portion of a blank material so that the underformed portion remains soft for subsequent forming operations.

Rateick, Jr teaches (see abstract and figures) a piston shoe. Rateick, Jr teach (see col 3, line 21-27) that the end opposite the cam engaging surface (flange) is crimped (i.e.-cold worked) around a piston head and this causes the flange to be hardened.

Therefore, it would have been obvious to one of ordinary skill in the art to have made the blank "2" of Beck et al by the process of cold heading a generally cylindrical blank because cold heading provides several advantages including leaving almost no waste material and also increased strength due to the cold working (i.e.-work harden) and because deforming only a portion of the blank would leave the rest of the blank in a soft state allowing for further deformation, such as the crimping step of Rateick, Jr. It would have been obvious to one of ordinary skill in the art to have cold-worked the opposite end of the wear resistant shoe (flange) of Beck et al by crimping as taught by Rateick, Jr because the crimping attaches the shoe to the piston head while simultaneously providing work hardening.

Regarding claim 2, Beck et al teach (see figures) and Rateick, Jr teaches (see col. 2, lines 53-54) that the end opposite the cam engaging portion is hollowed out by machining for receiving a rounded piston head.

Regarding claim 3, Rateick, Jr teaches (see col 3, lines 21-28) that crimping is used to cold-work the hollow skirt causing work hardening of the shoe while joining the shoe and piston. Therefore, it would have been obvious to one of ordinary skill in the art to have cold-worked the opposite end of the wear resistant shoe (flange) by crimping as taught by Rateick, Jr because the crimping attaches the shoe to the piston head while simultaneously providing work hardening.

Regarding claims 4 and 5, Beck et al teach (see Derwent abstract) that the shape of the piston shoe is machined from an alloy blank (2). Thus, the machining of the one end portion in order to form a cam engaging wear resistant surface occurs after the cold heading and prior to the crimping step because the opposite end portion must be machined before it is crimped and the machining of the blank occurs as one step applied at both ends at the same time.

Regarding claim 6, Rateick, Jr teaches (see col 2, lines 39-56) that the surface of the shoe is hardened by application of a Borofuse coating. Therefore, it would have been obvious to one of ordinary skill in the art to have applied surface hardening to the shoe in order to increase the wear resistance, as taught by Rateick, Jr, of the shoe.

Regarding claim 9, Beck et al do not expressly teach that the process can be applied to a cobalt alloy. Rateick, Jr teaches that the wear resistant shoe is made of work hardening cobalt alloys, which provide sufficient corrosion resistance. Therefore, it

would have been obvious to one of ordinary skill in the art to have used a cobalt alloy because Rateick, Jr teaches that the cobalt alloys provide work hardening and sufficient corrosion resistance. One of ordinary skill in the art would have had a reasonable expectation of successfully applying cold heading to the cobalt alloy of Rateick, Jr because Haynes 25 (disclosed by Rateick, Jr at col 3, lines 26-28) is able to be cold worked in the solution-treated state by typical cold working operations (for support, see page 402 of "Nickel, Cobalt and Their Alloys" at the top of col 1). Thus, one of ordinary skill in the art would have expected that Haynes 25 could be cold worked by any conventional means, including cold heading.

Regarding claim 10, Beck et al teach (see Figures and Derwent abstract) a method of making a wear resistant shoe that includes machining to finished dimensions to form a cam engaging surface.

Beck et al do no teach that the machined portion is first work hardened to a substantial depth or that surface hardening is applied to the machined portion.

"Cold Heading" describes a method of deforming a generally cylindrical blank to create one end which is increased in size radially and decreased in size axially. "Cold Heading" teaches (see col 1 of page 291) that the process has advantages over machining from suitable stock that include almost no waste material and increased strength from cold working.

Miller teaches (see abstract) the desirability of cold forming only a portion of a blank material so that the underformed portion remains soft for subsequent forming operations.

Rateick, Jr teaches (see col 2, lines 39-56) that the cam engaging surface of the shoe is hardened by application of a Borofuse coating.

Therefore, it would have been obvious to one of ordinary skill in the art to have made the blank "2" of Beck et al by the process of cold heading a generally cylindrical blank because cold heading provides several advantages including leaving almost no waste material and also increased strength due to the cold working (i.e.-work harden) and because deforming only a portion of the blank would leave the rest of the blank in a soft state allowing for further deformation, such as the crimping step of Rateick, Jr. It would have been obvious to one of ordinary skill in the art to have cold-worked the opposite end of the wear resistant shoe (flange) of Beck et al by crimping as taught by Rateick, Jr because the crimping attaches the shoe to the piston head while simultaneously providing work hardening.

Regarding claims 11, Beck et al teach (see Figures and Derwent abstract) that the process includes machining a hollow skirt out of the opposited end for receiving a rounded end of a piston rod.

Regarding claim 12, Rateick, Jr et al teach (see col 3, lines 21-27) crimping the hollow skirt about the rounded end of a piston rod causing work hardening or the cylindrical member. Therefore, it would have been obvious to one of ordinary skill in the art to have crimped the opposite end of the wear resistant shoe (flange) of Beck et al as taught by Rateick, Jr because the crimping attaches the shoe to the piston head while simultaneously providing work hardening.

Regarding claim 15, cold heading causes an upsetting of the metal. Therefore,

"Cold Heading" teaches upsetting one end of the rod stock. Otherwise, see above regarding claims 1-3.

Regarding claim 16, "Cold Heading" teaches (see first col) that the process causes work hardening (increased strength due to cold working).

Regarding claim 17, Rateick, Jr teaches (see col 2, lines 39-52) that the process of making the shoe includes surface hardening by treatment with a Borofuse coating. Therefore, it would have been obvious to one of ordinary skill in the art to have applied the surface hardening treatment of Rateick, Jr to the wear resistant shoe because the Borofuse coating causes an increase in wear resistance, thus increasing the lifetime of the shoe.

Regarding claim 18, Rateick, Jr teaches (see col 2, lines 26-28) that the crimping step causes work hardening.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beck et al (DE 19652326) in view of "Cold Heading", Miller (US 3,890,106) and Rateick, Jr (US 5,728,475) as applied to claims 1-6, 9-12 and 15-18 above, and further in view of Harada (JP 56-084468).

The teachings of Beck et al, "Cold Heading" and Rateick, Jr are described above in paragraph no. 6. Beck et al, "Cold Heading" and Rateick, Jr do not teach that the surface hardening is carried out by application of a TiN material.

Harada teaches (see English abstract) applying a TiN coating onto a Co-based alloy in order to impart excellent wear and corrosion resistance to the alloy.

Therefore, it would have been obvious to one of ordinary skill in the art to have

substituted the TiN coating of Harada for the Borofuse coating of Rateick, Jr because the two coatings are functional equivalents, because both provide increased wear resistance for the surface of a Co-based alloy.

6. Claims 19, 21 and 22 are rejected under 35 U.S.C. 103(a) as being clearly unpatentable over Rateick, Jr (US 5,728,475) in view of Davidson (US 4,003,765).

Rateick, Jr teaches the invention substantially as claimed. Rateick, Jr teaches (see col 2, lines 53-54 and figure 1) a process that includes machining a piece of rod stock to form a wear resistant shoe including a cam engaging wear resistant surface 12 and a hollow region 17, followed by (see col 2, lines 57-64) heat treatment of the hollow end of the rod stock to restore ductility and finally (see col 3, lines 21-28) crimping the periphery of the hollow region about a rounded end of a piston rod.

However, Rateick, Jr does not teach that the process starts with hardened rod stock.

Davidson teaches (see abstract) a cobalt base alloy and a heat treatment for hardening the alloy. The alloy has similar composition to Haynes 25. The advantages of the hardening process include (see col 2, lines 36-54) improved hardening characteristics while maintaining ductility.

Therefore, it would have been obvious to one of ordinary skill in the art to have utilized hardened material, such as that of Davidson, as the starting material, because it starts with an increased hardness (thus, providing more wear resistance) while maintaining sufficient ductility to be processed further.

Regarding claim 21, the process of Rateick, Jr. also includes (see col 2, lines 39-

44) a step of hardening the surface of the machined cam engaging surface (when the shoe is treated with a Borofuse coating).

Regarding claim 22, Rateick, Jr teaches (see col 3, lines 26-28) that the cold working (crimping) causes work hardening of the shoe.

Response to Arguments

7. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

8. Applicant's arguments filed 30 April 2003 with respect to claims 7, 19, 21 and 22 have been fully considered but they are not persuasive. Applicant has argued that:

a. The TiN coating of Harada and the Borofuse coating of Rateick, Jr are not functional equivalents because of the necessary requirements of the underlying substrate for a TiN coating and typical thicknesses of the TiN coating;

b. Rateick, Jr teach deliberately avoiding pre-hardened stock.

In response to Applicant's first argument, the work hardening that occurs due to the cold heading operation would provide the required underlying substrate surface required for the 'conventional' TiN coating described in Applicant's response. However, as can be seen in the abstract of Harada, the TiN coating of the prior art was not limited to the 'conventional' coating described in Applicant's response. Harada teaches that the TiN coating may be up to 20 μm thick, which would put it in the same league of coatings as the Borofuse coating of Rateick, Jr. Thus, the differences between the TiN and Borofuse coatings described by Applicant's are irrelevant because it does not discuss the full scope of the TiN coating of Harada.

In response to Applicant's second argument, though Rateick, Jr. teach that the starting material is unhardened, the reason for doing so is to maintain the workability of the alloy. Davidson teaches (as described above) that the hardening heat treatment is able to harden the alloy while maintaining necessary ductility for cold forming. Thus, Davidson provides the advantage of increased hardness/wear resistance, while still maintaining the requirement of Rateick, Jr. that the alloy have sufficient ductility to be deformed later in the process. Therefore, the teaching of Rateick, Jr. to avoid hardened stock is overcome by the disclosure of Davidson because the disadvantages of pre-hardened stock of Rateick, Jr. is overcome by the hardening treatment of Davidson.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 703-305-9927. The examiner can normally be reached on M-Th 10:00am-8:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 703-308-1146. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

hdw
June 5, 2003

Harry D Wilkins, III
Examiner
Art Unit 1742

ROY KING
SUPERVISORY PATENT EXAMINER
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